

IN THE CLAIMS:

1. **(Currently Amended)** A method for detecting, during normal operation of a locomotive and without interrupting said locomotive operation, faults indicative of an electrical short condition in at least one power device of a plurality of power devices of a propulsion system of said locomotive, said plurality of power devices connectable in parallel circuit to an external direct current power source operationally coupled for electrically powering said propulsion system as the locomotive travels along a rail track proximate said external power source, the method comprising:

upon said power source being electrically connected to the locomotive propulsion system when the locomotive is on said rail track proximate said external power source, measuring an initial voltage across a power line filter in a circuit with the power devices;

based on whether said initial voltage measurement is less than a predefined voltage threshold, measuring voltage developed across said line filter upon waiting a predefined transient time interval; and

determining the presence of said an electrical short condition in at least one of the power devices based on whether the magnitude of the voltage developed across the line filter rises to about power line voltage within said predefined transient time interval, wherein said time interval is sufficiently short to avoid interrupting said locomotive operation, and to avoid damage to the propulsion system in the event said electrical short condition is actually present, and further wherein said time interval is sufficiently long relative to the time constant of the filter to enable said voltage to rise to about line voltage when a short condition exists.

2. **(Canceled)**

3. **(Canceled)**

4. (Cancelled)

5. (Currently Amended) The method of claim [[4]]1 wherein said action of measuring of initial voltage is performed upon initialization of an electrical mode of operation of the locomotive propulsion system through said power rail.

6. (Original) The method of claim 5 wherein said action of measuring initial voltage is performed upon resumption of said electrical mode of operation through said power rail.

7. (Currently Amended) A method for detecting, during normal operation of a locomotive and without interrupting said locomotive operation, faults indicative of an electrical open condition in at least one of a plurality of power devices of a propulsion system of said locomotive, said plurality of power devices connectable in parallel circuit through a direct current (DC) link to an external DC power source operationally coupled for electrically powering said propulsion system as the locomotive travels along a rail track proximate said external power source, the method comprising:

determining the occurrence of a high current events based on whether the value of DC link current is above a predefined current threshold;

monitoring temperature of each power device connected in parallel circuit to the power source;

~~monitoring ambient temperature;~~

relating temperature of each power device to the other device ambient temperature to determine the occurrence of said electrical open condition based on whether the temperature difference between for any respective power device temperature and ambient temperature remains within exceeds a predefined limit relative to the other devices range during said high current event.

8. **(Original)** The method of claim 7 wherein said high current event is further determined based on time elapsed while the value of said DC link current is above said predefined current threshold.

9. **(Canceled)**

10. **(Canceled)**

11. **(Currently Amended)** A method for detecting, during normal operation of a locomotive and without interrupting said locomotive operation, electrical faulty conditions in at least one of a plurality of power devices of a propulsion system of said locomotive, said plurality of power devices connectedable in parallel circuit through a direct current (DC) link to an external DC power source operationally coupled for electrically powering said propulsion system as the locomotive travels along a rail track proximate said external power source, the method comprising:

a first sequence of actions for determining an electrical short condition in at least one of said power devices upon said power source being electrically connected to the locomotive propulsion system when the locomotive is on said rail track proximate said external power source, wherein said first sequence of actions is performed within a predefined transient time interval being sufficiently short to avoid interrupting said locomotive operation, and avoiding damage to the propulsion system in the event said electrical short condition is actually present; and

a second sequence of actions for determining an electrical open condition in at respective least one of said plurality of power devices during the occurrence of a high current events.

12. **(Currently Amended)** The method of claim 11, wherein said first sequence comprises:

measuring an initial voltage across a power line filter;
~~based on whether said initial voltage measurement is less than a predefined voltage threshold, measuring voltage developed across said line filter upon waiting a time interval; and~~

determining the presence of said electrical short condition in said at least one power device based on whether the magnitude of the voltage developed across the line filter rises to about power line voltage within said time interval.

13 **(Currently Amended)** The method of claim 4211, wherein said second sequence comprises:

determining the occurrence of said high current events based on whether the value of DC link current is above a predefined current threshold, said determining action further based on time elapsed while the value of said DC current link is above said predefined current threshold;

monitoring temperature of each power device connected to the power source;

~~monitoring ambient temperature;~~
~~relating temperature of each power device to ambient temperature~~
~~the other devices~~ to determine the occurrence of said electrical open condition based on whether ~~the-a temperature~~ difference between any respective power device temperature and said ambient temperature remains ~~within~~exceeds a predefined limit relative to the other devices~~range during said high current event.~~

14. **(New)** The method of claim 7 further comprising monitoring ambient temperature conditions for the power devices and considering the ambient conditions to determine the occurrence of said electrical open condition.